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I, JONNE YABSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2002953298 for a patent by COLIN W. FRANCIS and NEIL JOHN STEPHENS as filed on 12 December 2002.

WITNESS my hand this
Tenth day of September 2003

J R Yabsley

JONNE YABSLEY
TEAM LEADER EXAMINATION
SUPPORT AND SALES

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PROVISIONAL SPECIFICATION

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Invention Title: **Compression pile anchor device**

The invention is described in the following statement:

COMPRESSION PILE ANCHOR DEVICE

This invention relates generally to pile anchor devices and methods and apparatus for the installation of such devices. In one preferred form the invention is concerned with a screwed pile adapted to be able to re-compact earth above a hole forming device after the pile has been forced into the ground. This enables the pile to take angular as well as vertical loading and in one application may be retrievable and re-useable.

Many applications in the construction and building industries require the use of a temporary pile to support or maintain the position of an item or part of the building or structure or a temporary structure or item of plant required for use in that construction. Currently known screwed or driven piles are not easily retrieved at the completion of their use nor are screwed piles suitable for side loads because as the pile is screwed into the ground the earth is disturbed rendering it unsuitable for side or lateral loading due to the lose of compaction around the top of the pile. Where side or lateral loading is required, a current practice is to bore a hole into the ground and construct a concrete reinforced pile designed to take the required side or lateral loading. This is both expensive and time consuming in the construction of the pile and the time lost waiting for the concrete to cure and for the strength of the concrete to come up to a point where side loads can be applied. A concrete pile may be able to be left in the ground after use but in many cases its location may require its removal with all the associated cost and delays.

It is an object according to one aspect of the present invention to provide a pile anchor device which alleviates one or more of the aforementioned problems.

It is an object according to another aspect of the present invention to provide an improved method and apparatus for the installation of a pile anchor device.

According to one aspect of the present invention there is provided a pile anchor device which is insertable into ground for supporting an article, the pile anchor device including; a mounting assembly including a main body having a mounting section and a

stabilising section; an anchoring assembly including a drive shaft, a drive tool operatively connected to the drive shaft; an installing mechanism operable to cause relative axial movement between the mounting assembly and the anchoring assembly. The arrangement is such that the anchoring assembly is driven into the ground to a selected position and thereafter the installation mechanism is activated to cause relative movement between the mounting assembly and the anchoring assembly to force the mounting assembly at least partially into the ground.

In one embodiment, the drive tool may include a drilling element towards one end of the drive shaft. The drilling element may be in the form of an auger. The drive tool may further include a cutting bit at one end of the drive shaft, and in a preferred form the cutting bit is adapted to act as a centering guide. The drive shaft may include at least a part tubular body rotatable about its longitudinal axis.

In one form, the stabilising section may include a sleeve portion adapted to receive the drive shaft therein, the drive shaft being adapted for axial movement relative to the sleeve section. Preferably, the sleeve portion and the drive shaft are mounted for telescopic movement relative to one another. The drive shaft and sleeve portion may be mounted for relative axial movement but relative rotational movement is inhibited.

Preferably, the mounting section includes a mounting plate at one end of the sleeve section. The mounting plate is adapted to support the article or articles to be mounted to the device.

In one form, the stabilising section may include a plurality of fins extending from the sleeve portion. Preferably, the fins taper inwardly from the end adjacent the mounting plate towards the other end. The fins may form gussets to stop distortion of mounting plate.

The installation mechanism may, in one form include complementary threaded elements one being secured to the drive shaft the other being operatively connected to the

mounting assembly such that rotation of one of the threaded elements causes relative axial movement between the mounting assembly and drive assembly. Preferably, the threaded elements include a member having an threaded aperture, the member being secured to the drive shaft and the other threaded element includes a threaded shaft receivable within the aperture and extending through the sleeve. The threaded shaft may include a head or nut at one end which can be operatively connected to a drive. The arrangement is such that rotation of the threaded shaft causes relative axial movement. Preferably, the threaded members have a left hand thread. In another form the relative axial movement may be effected by an hydraulic system.

According to another aspect of the present invention there is provided a coupling device for use with a pile anchor device of the type described either in the broad or more preferred forms, the coupling device being suitable for connecting the pile anchor device to a drive unit which has a rotatable drive output member. The coupling device includes a first drive connector operatively connectible to the installing mechanism of the pile anchor device, and a second drive connector operatively connectible to the anchoring assembly of the pile anchor device. The first and second drive connectors are rotatable in response to rotation of the drive output member of the drive unit, the second drive connector being arranged so that it can adopt a first mode of operation in which it is connected to the anchoring assembly and a second mode of operation wherein it is disconnected from the anchoring assembly when the second drive connector is connected to the installation mechanism.

The second drive connector may be movable relative to the first drive connector for enabling adoption of the first and second modes of operation. In one form, the second drive connector is operatively connected to said anchoring assembly via said mounting assembly. The second drive connector may be operatively mounted on said first drive connector for axial movement relative thereto. The first and second drive connectors may be interlinked via a co-operating pin and slot.

In one form the second drive connector includes a sleeve mounted for sliding

movement on said first drive connector and a mounting plate operatively connectible to the mounting section of the pile anchor assembly. The mounting plate may include a plurality of mounting pins which are receivable in apertures in the mounting section of the pile anchor assembly.

The coupling device may further include means for moving the second drive connector relative to the first drive connector. In one form the moving means may include one or more hydraulic piston/cylinder assemblies. It will be appreciated other moving means may be utilised such as a mechanical or magnetic drive.

Guide bearing means may be provided for connecting the piston/cylinder assemblies to the second drive connector. The guide bearing means may include spaced apart wheels which receive a peripheral edge portion of a bearing plate therebetween the bearing plate being connected to the second drive connector.

In one form the first drive connector may be connected to or form part of the drive output member. The first and second drive connectors may be of square, rectangular, hexagonal or any other suitably shaped cross section.

The device may be installed to a predetermined vertical loading. Once the anchoring assembly of the pile is positioned in the ground, the mounting assembly and in particular the stabilising section of the device compacts the ground above the anchoring assembly to a predetermined compaction providing stability to the top or ground level section of the pile which is then suitable for angular side or lateral loading relative to the longitudinal axis of the device.

The device may be fitted to a suitable hydraulic drive unit which provides for picking up of a device; positioning it with the point in a correct location, driving the anchoring assembly into the ground and then compacting the soil above the assembly all operations carried out by a single operator. The removal of the pile after use is again a one-person operation.

The use of the pile anchor device described above is not limited to temporary piling as it's use as a permanent pile will find many applications. The size and required depth of the pile anchor device may be changed to suit the required loading. Materials of construction can also be changed to suit ground and environment situations.

In order to enable a clearer understanding of the invention, drawings illustrating example embodiments are attached, and in those drawings:

Figure 1 is a schematic perspective view of a pile anchor device according to one aspect of the present invention;

Figure 2 is a sectional view of the device shown in Figure 1; and

Figures 3 and 4 are schematic views of a coupling device according to another aspect of the present invention shown in two operating positions.

Referring to Figures 1 and 2 of the drawings there is shown a pile anchor device 10 including a mounting assembly 12 having a mounting section 14 and a stabilising section 20. The mounting section 14 includes a mounting plate 16 which in the installed position is adapted to support the article to be mounted to the anchor device. The stabilising section 20 includes a sleeve portion 22 having fins or gussets 24 radially extending therefrom. The plate 16 includes aperture 18 which may be tapped or threaded for mounting an article to the plate.

The device further includes an anchoring assembly 30 including a drive shaft 32 and drive tool 36 at one end thereof. The drive tool 36 includes a drilling element 37 in the form of an auger 38 and a cutting bit 39.

The end of the drive shaft 32 remote from the drive tool is adapted to be received within sleeve portion 22 of the mounting section and the two parts are arranged for slidable

movement relative to one another in telescopic fashion. In one form the sleeve portion 22 and drive shaft 32 are generally square or rectangular in cross section so that relative rotation between the two parts is inhibited.

As shown in the drawings, the fins 24 are connected to one another such as by welding so that the sides thereof form the sleeve. It will be appreciated that the sleeve could be formed from a tube with the fins secured to the outer surface thereof. The mounting plate 16 has apertures 18 therein for use in the attachment of the article which is to be mounted to the device when installed.

With particular reference to Figure 2 there is shown an installation mechanism 40 which includes a threaded block 41 and a cooperating threaded shaft or bolt 42 having a nut 43 at one end thereof. A thrust race washer or disc 44 is provided between nut 43 and mounting plate 16.

With reference to Figure 3, there is shown a coupling device 50 for connecting pile anchor device 10 to a drive unit 80 which has a rotatable output 82. The drive unit 80 can be mounted to a lifting arm of a vehicle as is known. The coupling device includes a first drive connector 52 and a second drive connector 54. The second drive connector 54 includes a sleeve 56 and a support plate 60 with mounting pins 62 extending therefrom. The mounting pins 62 are receivable in and adapted to be locked into keyhole apertures 19 in the mounting plate 16. The coupling device further includes means 70 for moving the second drive connector relative to the first drive connector, the means for moving 70 including a plurality of piston cylinder assemblies 71, a guide bearing means 72 in the form of tracking wheels 73 and bearing plate 68, the plate being sandwiched at its peripheral edge between opposed sets of wheels 73.

In operation, the drive unit 80 with the coupling device 50 mounted thereto is positioned above an anchor device required for use. The unit is lowered until pins 62 can be positioned within key hole openings 19 in mounting plate 16 and locked in position. In this position rotation of the output 82 of drive unit 80 will cause rotation of the mounting

assembly 12 and anchoring assembly 30 together.

The device now mounted to the drive unit is positioned above the ground into which it is to be located. The drive unit 80 is then activated causing the anchoring assembly to be driven into the ground. When the anchoring assembly is properly positioned in the ground the pins 62 are decoupled from the mounting plate 16 and lifted clear by hydraulic cylinders 71. It will be appreciated that other means such as mechanical or magnetic means could be used. Drive connector 52 can now be fitted to the nut 43 of the threaded shaft 42. Rotation of the output 82 of the drive unit 80 will now cause rotation of the threaded shaft 42 of the installation mechanism, thus drawing the mounting assembly of the device to a position on the ground as a result of relative movement between the mounting assembly and the anchoring assembly, the latter of which is already positioned.

The square nut 43 provides both the alignment of the pins 62 and the drive for the bolt 42. The fins have a dual function of providing a lead into the ground as the top mounting plate is brought down to apply load to the ground and to provide lateral stability to the top mounting plate of the screwed pile so as to inhibit cupping of the plate.

The mounting assembly only rotates until the auger has met the required pre-determined torque or depth at which point the pins 62 are disengaged allowed the drive to freely rotate the square nut 43.

As the threaded rod rotates the mounting assembly is drawn into the disturbed earth around the top of the pile. With the fins drawn fully into the soil the top mounting plate comes in contact with the earth above the auger. With the mounting plate in contact with the ground the rotation of the square nut is continued drawing the top plate firmly against the disturbed earth around the top of the pile, this applies a compacting pressure to the earth which is continued until the pre-determined thrust is reached forming a compacted area of soil between the auger and the mounting plate stabilising the area.

With the auger taken to it's predetermined load and the top mounting plate compacting and stabilising the soil at the top of the pile, the pile is now suitable for both compression and lateral loading in any direction.

To remove the pile after use the square nut is rotated in the opposite direction which lifts the directional load fins clear of the ground. When the fins are clear of the ground the drive pins 62 of the coupling device are engaged and the pile rotated so as to screw the auger and pile out of the ground. With the pile free of the ground it can be cleaned ready for re-use.

The hydraulic pressure required to drive the pile into the ground can be recorded and/or displayed on a printout, providing a permanent record and information for quality control records.

Finally, it is to be understood that the inventive concept in any of its aspects can be incorporated in many different constructions so that the generality of the preceding description is not to be superseded by the particularity of the attached drawings. Various alterations, modifications and/or additions may be incorporated into the various constructions and arrangements of parts without departing from the spirit or ambit of the invention.

Dated this 11th day of December, 2002

COLIN W. FRANCIS and NEIL JOHN STEPHENS

By Its Patent Attorneys

DAVIES COLLISON CAVE

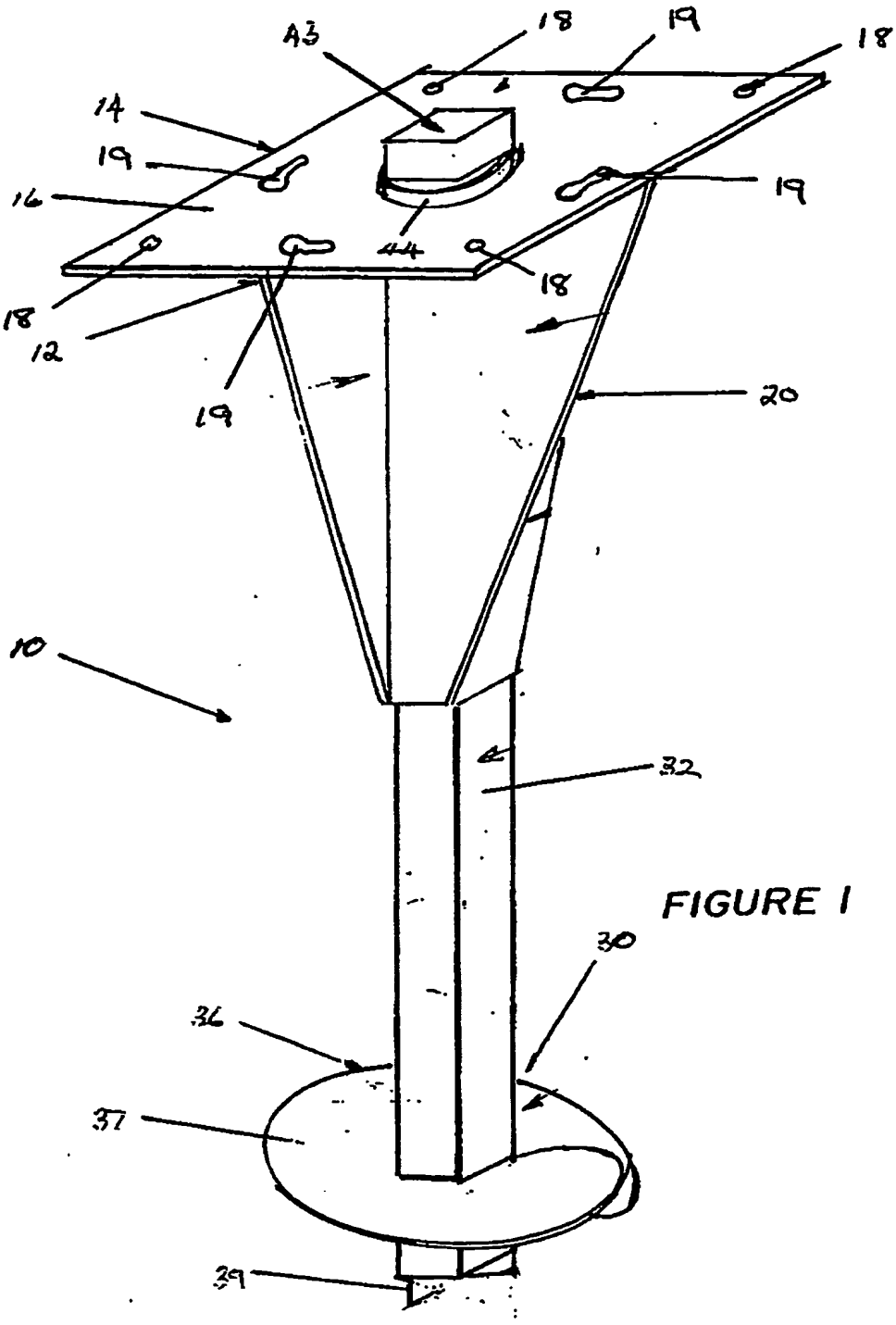

FIGURE 1

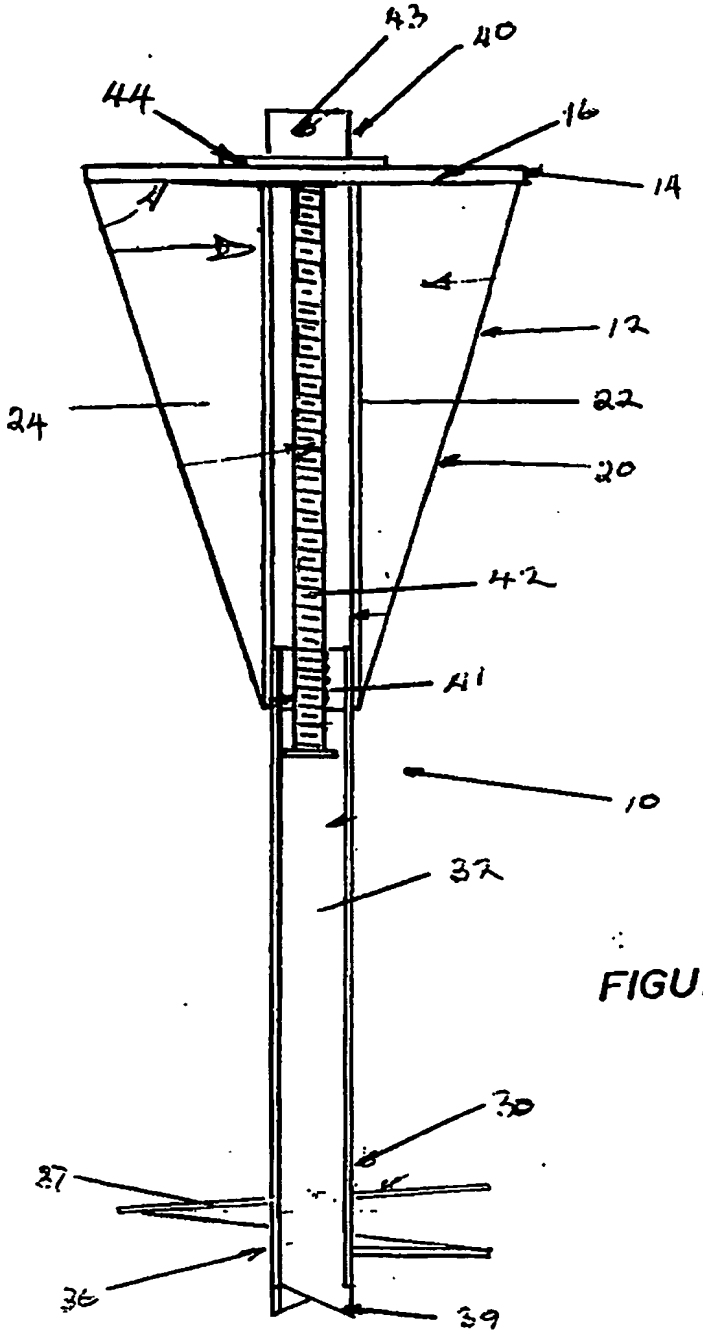

FIGURE 2

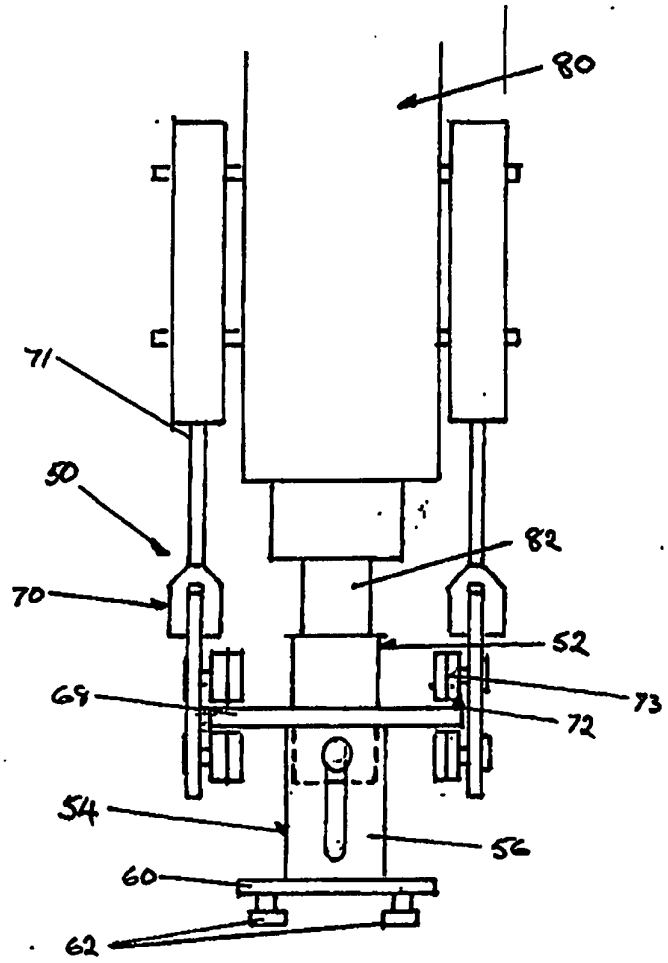

FIGURE 3

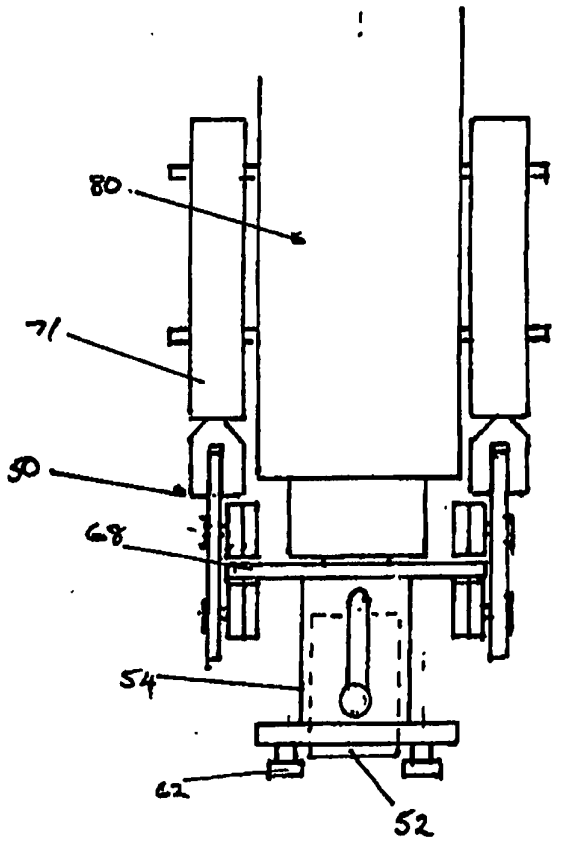

FIGURE 4